

## Continuous Professional Development Research in the Library and Information Science: A Bibliometric Analysis and Knowledge Mapping

Ikhlaq ur Rehman\*, Javaid Ahmad Wani and Shabir Ahmad Ganaie

*Department of Library and Information Science, University of Kashmir, India*

*\*E-mail: ak.edu05@gmail.com*

### ABSTRACT

This study aims to examine the availability of literature on “Continuous Professional Development” (CPD) related to the Library and Information Science (LIS) professionals from 2002 to 2021 in the Web of Science (WoS) database. A comprehensive search strategy coupled with filters was devised to extract relevant data from the database. It led to the retrieval of 345 documents. This was followed by “abstract screening analysis” to achieve the highest level of desired “content relevancy”. Finally, 268 documents were selected and saved in the marked list for further analysis. Data analysis and network visualisation were performed using the R bibliometric package and VOSviewer respectively. The study analysed various parameters such as: publication and citation trends; prolific authors, sources and countries; highly cited articles and nature of authorship and collaboration pattern; the most frequently used keywords; and the citation analysis pattern of authors, articles and sources.

**Keywords:** Continuous professional development; Continuing education; Professional development; Lifelong learning; CPD; Bibliometrics; WoS; VOSviewer

### NOMENCLATURE

CPD	:	Continuous Professional Development
CEP	:	Continuing Education Programmes
CE	:	Continuing Education
CPE	:	Continuing Professional Education
LL	:	Lifelong Learning

### 1. INTRODUCTION

We live in a time of rapid change that is mostly driven by technical advancements, and this development is especially beneficial to professions that provide services, like librarianship. Individuals are compelled by change and innovation to keep up with changes and actively contribute to them. In this aspect, Continuous Professional Development (CPD) offers a means through which professionals can stay current with changes in “social, economic, and technical advances”<sup>1</sup>. According to Rafiq *et al.*<sup>2</sup>, CPD includes “all activities and efforts whether formal or informal that are employed by an individual to upgrade his/her knowledge, abilities and competencies to become more effective professional in exercise of his/her professional duties throughout his/her working life”. The major goals of CPD activities are to bridge the knowledge gap between academia and the workplace, “maintain or advance levels of technical and professional competence”, guarantee the effectiveness of work, and acquire new knowledge in pertinent fields. It improves a practitioner’s capacity to provide services that meet users’ needs while also “building the importance of libraries, information centres”, and the institutions that professionals

work for. It’s crucial for professionals to keep up with the most recent developments in their field, particularly those that concern “technology and its inventions”, as their work is service-oriented<sup>1</sup>.

Literature reveals that the modern technologies have drastically changed the work culture in libraries<sup>3</sup>. Hence, there is a leeway for the library professionals to embrace the advanced set of skills, and an adequate knowledge<sup>4</sup> so that the information seekers will get benefitted<sup>5</sup>. Therefore, libraries must reposition themselves to fulfil the user expectations<sup>6</sup>. Hence, it is vital to undertake research that will guide decisions about professional development. Therefore, the study is an attempt to gauge the research output relating to CPD of the “Library and Information Science” (LIS) professionals through “bibliometric approach”. Furthermore, librarians are now faced with new tasks and responsibilities as a result of the technology influence in the LIS setting. Therefore, librarians must be skilled in “digital technology processing, metadata cataloguing, bibliographic data exchange, digital preservation, and data analysis”<sup>7</sup>. As a result, the librarian takes on a more active position rather than a passive one<sup>8</sup>. In today’s society, CPD is crucial and cannot be ignored. To fulfil the demands of their jobs, professionals must keep themselves current<sup>2</sup>. Multiple studies have suggested the importance of CPD for LIS professionals<sup>9-13</sup>.

Bibliometric approaches have a long back history in LIS domain. Researchers are of the opinion that “Alfred Lotka” presented the first bibliometrics rules in 1926, which marked the beginning of the bibliometrics<sup>14</sup>. Similarly, “Samuel Bradford” contributed the law of bibliometrics in 1934 “(Bradford’s

law)<sup>15</sup>. After that another advocate of bibliometrics, “Eugene Garfield” come up with the “Science Citation Index” (SCI) in 1955. The emergence of SCI gave a new momentum to the bibliometrics research domain<sup>16</sup>. As the discipline progressed, bibliometric terms emerged<sup>17</sup>. Pritchard coined the term “Bibliometrics” in 1969 to mean “the application of mathematics and statistical methods to books and other media of communications”<sup>18</sup>.

**2. LITERATURE REVIEW**

The literature analysis suggested that multiple bibliometric studies have been carried out world-wide in the LIS field. Wani *et al.*<sup>19</sup> gauged the research output of South African authors in the field of LIS using the WoS database. Ashiq *et al.*<sup>20</sup> conducted a bibliometric study on Library Service Quality (LSQ) from 1972 to 2020 using the Scopus & Web of Science databases. Islam and Roy<sup>21</sup> studied the scholarly productivity of Bangladesh in the LIS “from 1971 to 2020” using WoS and Scopus. Sahu and Parabhoi<sup>22</sup> studied the research trends in the LIS in India from 2014 to 2018 using the Scopus database. Patil<sup>23</sup> studied the global LIS research output published during 2015-2019 using the Scopus database. Ahmad *et al.*<sup>24</sup> gauged literature on Knowledge Management (KM) in the LIS field from 1900 to 2017 using the WoS database. Okeji<sup>25</sup> evaluated “the growth of academic librarians’ research output in Nigeria”, as well as authorship patterns, & degree of collaboration. Ahmad *et al.*<sup>26</sup> assessed scholarly research output in the LIS field from 2003 to 2017 through the WoS database. Shukla *et al.*<sup>27</sup> measured the research output of Indian authors in the field of LIS from 1980 to 2019 through the Incites.. Ahmad *et al.*<sup>28</sup> assessed the research productivity on “digital library” world-wide from “2002 to 2016” using the WoS database. Garg and Sharma<sup>29</sup> measured the Indian scholarly productivity in the field of LIS during 2005-2015 through “the Indian Citation Index (ICI)”. Pandita and Singh<sup>30</sup> examined the LIS research trends globally from 2004 to 2013 using Scopus. The review of literature indicates that no study has been reported

in the literature that deals with the bibliometric analysis of the papers related to the “Continuous Professional Development” of the LIS professionals. Therefore, the current study attempts to address the below questions:

- Q1. What is the scholarly output and citation trends in CPD research related to the LIS professionals?
- Q2. Who are the most prolific authors, sources and countries?
- Q3. Which are the highly cited articles and nature of authorship and collaboration pattern?
- Q4. What are the most frequently used keywords; and the citation analysis pattern of authors, articles and sources?

**3. METHODOLOGY**

**3.1 Data Curation**

To completely encapsulate the scholarly literature on CPD in LIS literature the authors gathered the actual corpus of various scientific papers using the WoS. The search query framed to get the desired number of articles was: ((*TS = (continuing education) OR TS = (continuous professional development) OR TS = (lifelong learning) OR TS = (continuing education, librarians) OR TS = (continuous professional development, library and information science professionals) OR TS = (continuing education programmes) OR TS = (continuing professional development programmes) OR TS = (professional development)*))). After applying various filters as presented in Fig. 1, a total 345 articles were retrieved. But the final results were reduced to 268 articles after the screening of titles and abstracts. Abstract screening involves accessing and reviewing each abstract of retrieved papers to ensure that they are relevant to the study’s scope (For this study, Topic= CPD/CEP/CE/CPE/LL; Inclusion criterion: LIS professionals/ libraries/ librarians). Other researchers have used this manual approach of abstract screening<sup>31</sup>. One advantage of this study over other bibliometric studies that use large samples without assessing content relevance (mostly because of the extensiveness of the subject under study) is the use of the abstract screening method. Large data sets do not always imply that every article

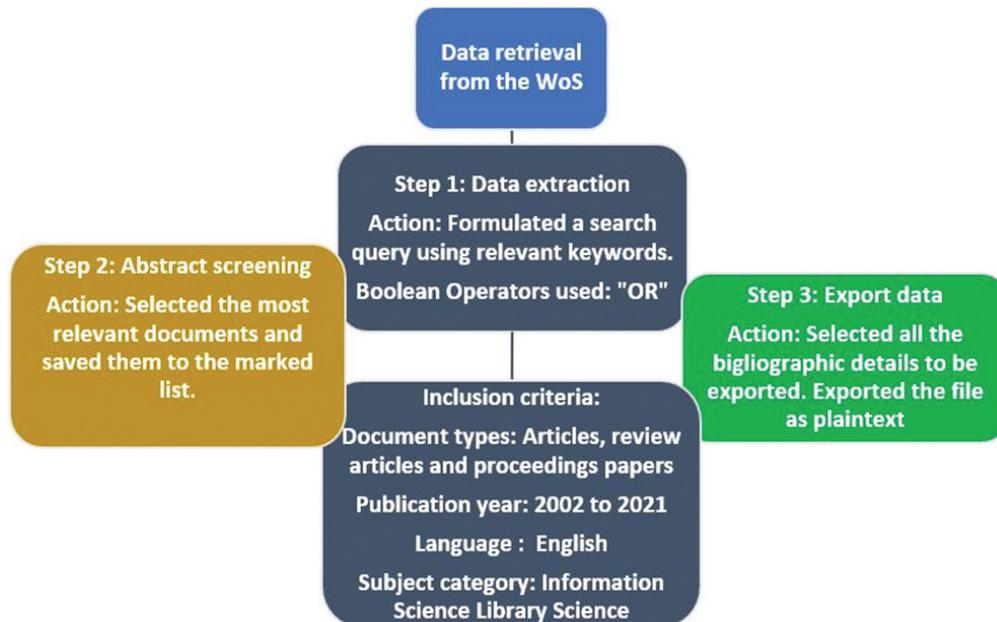


Figure 1. Data extraction strategy.

in the sample is related to the phenomena under investigation. As a result, abstract screening is required to ensure content relevance. Abstract screening improves the study’s validity and reliability, especially for the most specific research like this one.

**3.2 Procedure Applied**

The current study’s methodology is bibliometric analysis, which is a quantitative way of examining published academic works. Liang and Liu<sup>32</sup> demonstrate the meticulous usage of bibliometric analysis in the LIS research domain. The metrics used are “publication related metrics”, “citation-related metrics”, and “citation and publication related metrics”. Moreover, the authors also used “citation analysis, co-word analysis, and co-authorship analysis”<sup>33</sup>.

**3.3 Visualisation Approach**

“The distance-based approach of visualisation” was employed in this study. Nodes are typically positioned in a two-dimensional area. “Node edges” are typically invisible in most cases. The most used approach for ascertaining the placement of “nodes” is “multidimensional scaling”<sup>34-35</sup>. The literature has suggested a few substitutes. to “multidimensional scaling”, like the VOS technique, as suggested by Van Eck and Waltman<sup>36</sup> and used in visualisation in “VOSviewer software”. The analysis by VOSviewer demonstrates the word/term affinity by modality. Therefore, the current study employed VOSviewer for network visualisation.

**4. DATA ANALYSIS AND RESULTS**

**4.1 Publications and Citations Trends**

The research output on CPD of the LIS professionals is available from early 2000 in the WoS as illustrated in Fig. 2. The earliest publications could be tracked from the year 2002 with 12 publications. Since then, the research productivity has been erratic. Garg and Sharma<sup>29</sup> also found the annual growth rate of LIS research output to be irregular. These discrepancies make it challenging to forecast upcoming CPD research trends in LIS literature as the scholarly output keeps fluctuating year to year. The most prolific years in terms of published documents were 2020 and 2021. Other studies in LIS also found latter

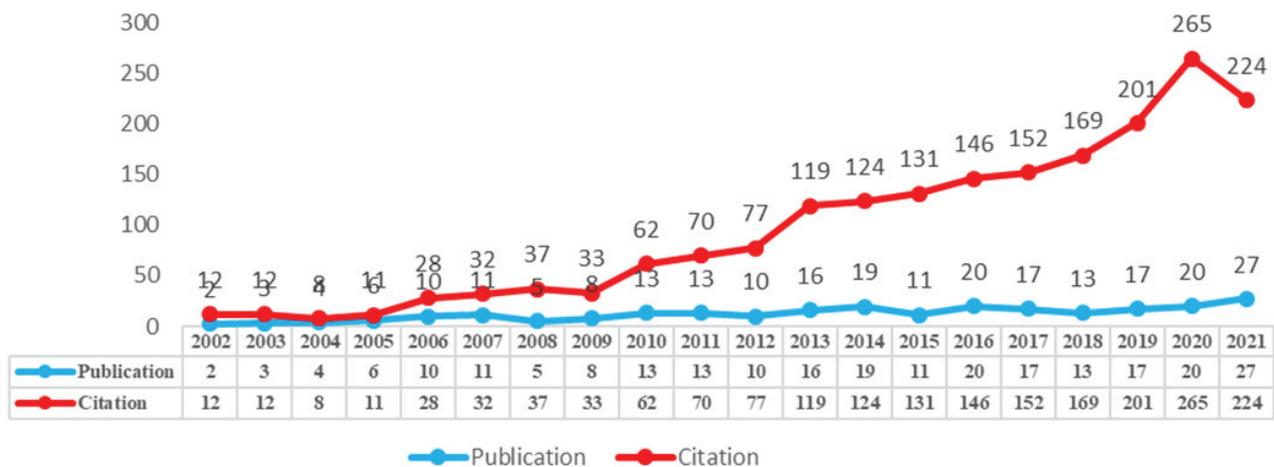
years to be most productive<sup>24,26</sup>. In terms of citations, 2020 was determined to be the most prolific year. These articles received 1890 citations from 2002 to 2021. Figure 2 shows that over this period, the number of citations has grown steadily. Particularly, in the last few years, the citation count has surged. A similar trend was noticed by Ahmad *et al.*<sup>26</sup>

**4.2 Most Productive Countries**

Table 1 highlights the top 10 productive countries in CPD literature. These countries contributed to 236 publications (88 %). As evident from the Table 1 developed countries have produced the bulk of the output. This is in line with some previous studies<sup>23-24,26,30</sup> who also found that developing countries lag behind developed countries in terms of the LIS research output. The USA tops the list with 117 articles followed by England and Australia contributing to 35 and 20 articles respectively However, three of the top ten most productive nations in the field of CPD are “South Africa, Pakistan, and Nigeria”, which is remarkable. Even though these three countries are considered underdeveloped, they have set a precedent and sparked research interest globally. Since library infrastructure is much more developed in China and Japan, a sizable amount of research on CPD in libraries is anticipated. But, the results of Table 1 don’t support this argument. It could be because the study’s search criteria were confined to articles published in English language only.

**Table 1. Top 10 productive countries**

Rank	Countries	Publications (n=236)
1	USA	117
2	England	35
3	Australia	20
4	South Africa	14
5	Canada	12
6	Pakistan	11
7	Nigeria	9
8	China	8
9	Japan	6
10	Iran	4



**Figure 2. Publication and citation trend 2002-2021.**

**Table 2. Top 10 contributing journals**

Rank	Source	Publication	Country
1	Journal of Librarianship and Information Science	23	UK
2	The Journal of Academic Librarianship	22	UK
3	Library Trends	21	USA
4	Journal of the Medical Library Association	17	USA
5	Health Information and Libraries Journal	13	UK
6	Portal-Libraries and the Academy	11	USA
7	Electronic Library	9	UK
8	College and Research Libraries	8	USA
9	ASLIB Proceedings	7	UK
9	Australian Library Journal	7	UK
9	Information Development	7	USA
9	Library and Information Science Research	7	UK
10	Information Research- An International Electronic Journal	5	Sweden
10	Library Hitech	5	UK
10	Library Resources & Technical Services	5	USA

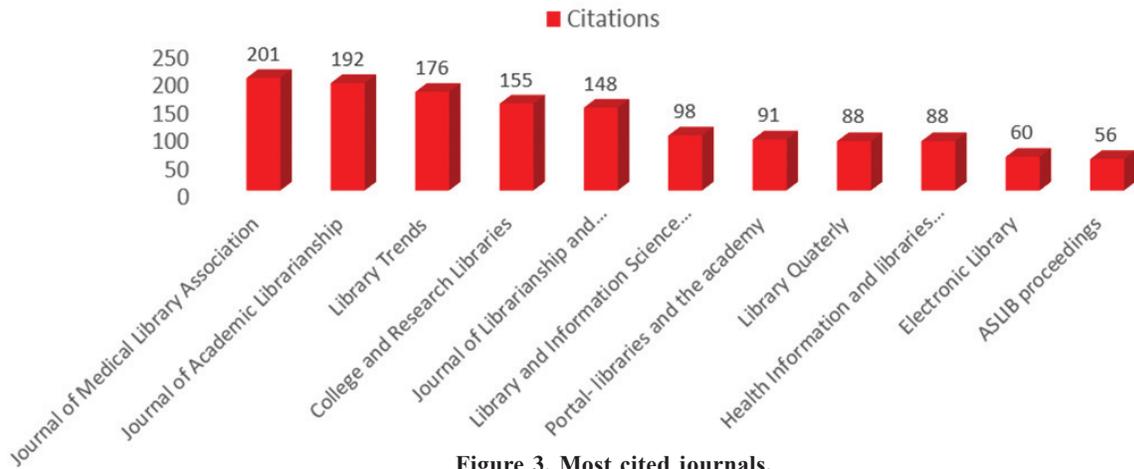
**4.3 Preferred Sources: Citation Mapping and Visualisation**

Table 2 highlights the top 10 contributing journals to CPD literature. The most prolific contributor is the “*Journal of Librarianship and Information Science*” with 23 articles followed by the “*Journal of Academic Librarianship and Library Trends*” with 22 and 21 articles respectively. These are followed by the “*Journal of Medical Library Association* (17 articles) and the *Health Information and Libraries Journal*” (13 articles). In terms of citations, the “*Journal of Medical Library Association*” (201 citations), “*The Journal of Academic Librarianship*” (192 citations), *Library Trends* (176 citations), *College and Research Libraries* (155 citations) and the *Journal of Librarianship and Information Science*” (148 citations) are the most productive journals as illustrated in Fig. 3.

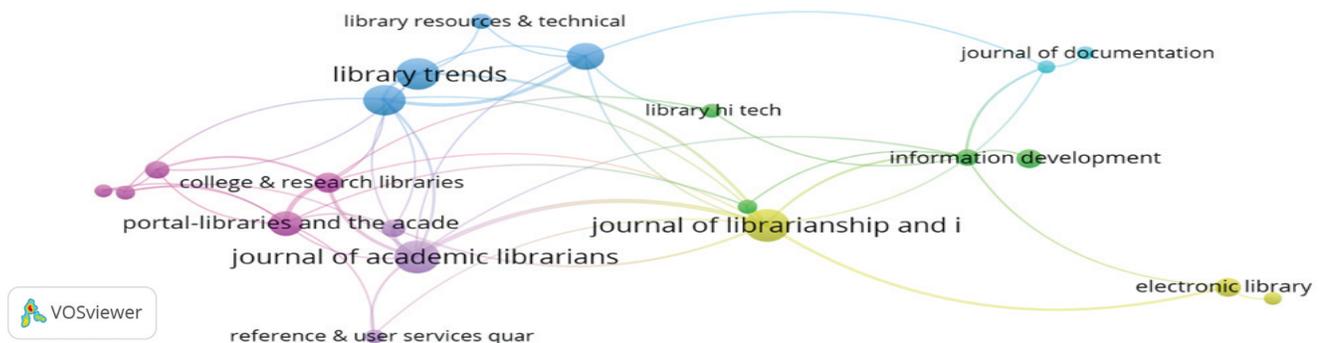
Furthermore, citation mapping and visualisation of the sources resulted in a set of 21 connected items across 6 Clusters (C) with 49 links and a Total Link Strength (TLS) of 86. Cluster 1 consisted of 5 items, C2 (4 items), C3(4 items), C4 (3 items), C5 (3 items), C6 (2 items). The results are presented in Fig. 4.

**4.4 Most Cited Authors: Citation Analysis Visualisation**

Table 3 shows the top 10 highly cited authors. Corral, S has the highest citations (142) across 3 publications followed by Afzal, W and Kennan, MA with 95 citations each. Walter, S ranks third with 89 citations across 2 publications followed by Kurbanoglu SS with 83 citations.



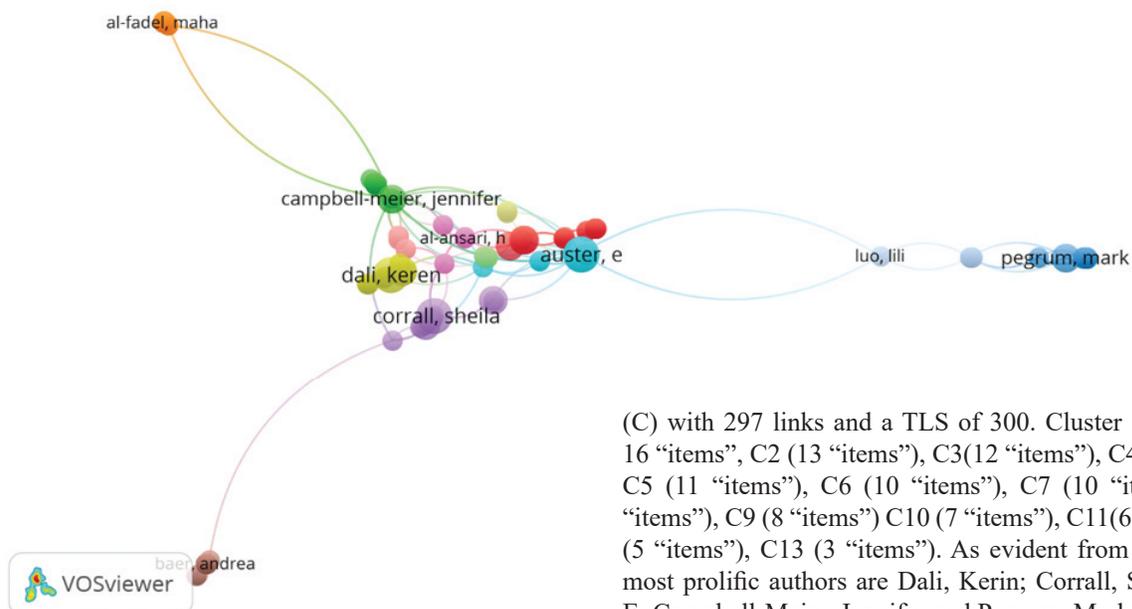
**Figure 3. Most cited journals.**



**Figure 4. Visualisation and citation analysis of sources.**

**Table 3. Top ten highly cited articles**

Rank	Authors	Citations	Publications	Country	Parent institution
1	CORRALL S	142	3	USA	University of Pittsburgh, USA
2	AFZAL W	95	1	Australia	Charles Sturt University, Australia
2	KENNAN MA	95	1	Australia	Charles Sturt University, Australia
3	WALTER S	89	2	USA	University of Illinois, USA
4	KURBANOGLU SS	83	1	Turkey	Hacettepe University
5	OVERALL PM	64	1	USA	University of Arizona
6	COOPER ID	57	1	USA	National Institute of Health, USA
6	CRUM JA	57	1	USA	University of Arizona, USA
7	RAJU J	53	1	South Africa	University of Cape town, South Africa
8	AUSTER E	43	3	Canada	University of Toronto, Canada
8	CHAN DC	43	3	Canada	University of Western Ontario, Canada
9	BEWICK L	42	1	England	University of Central Lancashire, England
10	BRANCOLINI KR	39	1	England	The University of Sheffield, England
10	KENNEDY MR	39	1	USA	Loyola Marymount University, USA



**Figure 5. Visualisation and citation analysis of authors.**

Figure 5 demonstrates the clustering of citation analysis of authors. Each cluster symbolises the non-overlapping feature, which means that none of the objects in a given group can overlap. In addition, each cluster has its own colour characteristics while the size of the node indicates the importance and weight of an element in a group, as well as how it compares to the other cluster’s parts. It’s worth noting that the proximity of items and groups can disclose item interrelationships. Before performing visualisation analysis, a specific criterion was set to get the relevant insights. The threshold for an author was set to 1 document which resulted 532 authors. Further analysis resulted in the “largest set of” connected “items” consisting of 122 “items” across 13 Clusters

(C) with 297 links and a TLS of 300. Cluster 1 consisted of 16 “items”, C2 (13 “items”), C3(12 “items”), C4 (12 “items”), C5 (11 “items”), C6 (10 “items”), C7 (10 “items”), C8 (9 “items”), C9 (8 “items”) C10 (7 “items”), C11(6 “items”), C12 (5 “items”), C13 (3 “items”). As evident from the figure the most prolific authors are Dali, Kerin; Corral, Sheila; Auster, E; Campbell-Meier, Jennifer and Pegrum, Mark.

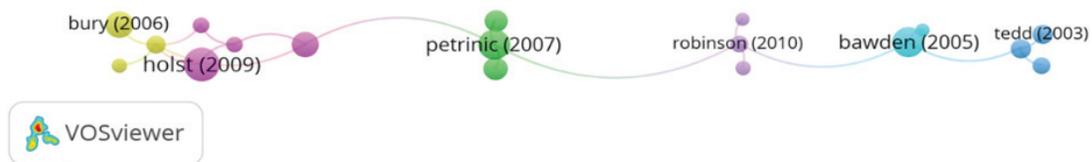
**4.5 Most Cited Articles and Citations Analysis  
Visualisation**

Table 4 presents the top 10 highly cited studies. The paper by Corral *et al.* (2013) accounted for the most number of citations followed by Kurbanoglu, (2003), Walter (2008), Overall (2009), Cooper and Crum (2013). In terms of average citations per year, Corral et al (2013) again topped the list followed by Raju (2014), Cooper and Crum (2013). However, none of the studies was funded. Therefore, it contradicts with earlier studies that concluded that funded articles received more citations than non-funded ones<sup>37-38</sup>.

Figure 6 presents the analysis of article citations. The minimum criterion was set to four citations for each article. The “largest set” of linked documents among the 268 documents

**Table 4. Top 10 highly cited articles**

Rank	Title	Authors	Total citations	Average citation per year	Whether funded or not?	Journal	Country
1	Bibliometrics and Research Data Management Services: Emerging trends in Library support for research	Corral <i>et al.</i> , 2013	96	9.6	No	<i>Library Trends</i>	USA
2	Self-efficacy: a concept closely linked to information literacy and lifelong learning	Kurbanoglu, 2003	83	4.15	No	<i>Journal of Documentation</i>	UK
3	Librarians as teachers: A qualitative inquiry into professional identity	Walter, 2008	65	4.3	No	<i>College &amp; Research Libraries</i>	USA
4	Cultural competence: A conceptual framework for Library and Information Science professionals	Overall, 2009	67	4.5	No	<i>Library Quarterly</i>	USA
5	New activities and changing roles of health sciences librarians: a systematic review, 1990-2012	Cooper and Crum, 2013	57	5.7	No	<i>Journal of the Medical Library Association</i>	USA
6	Knowledge and skills for the digital era academic library	Raju, 2014	53	5.9	No	<i>The Journal of Academic Librarianship</i>	UK
7	Developing librarians as teachers: A study of their pedagogical knowledge	Bewick and Corral, 2010	42	3.2	No	<i>Journal of Librarianship and Information Science</i>	UK
8	Academic Librarian Research: A Survey of Attitudes, Involvement, and Perceived Capabilities	Kennedy and Brancolini, 2012	39	3.5	No	<i>College &amp; Research Libraries</i>	USA
9	Factors contributing to the professional development of reference librarians	Chan and Auster, 2003	31	1.5	No	<i>Library and Information Science Research</i>	UK
10	Vital pathways for hospital librarians: present and future roles	Holst <i>et al.</i> , 2009	25	1.8	No	<i>Journal of the Medical Library Association</i>	USA

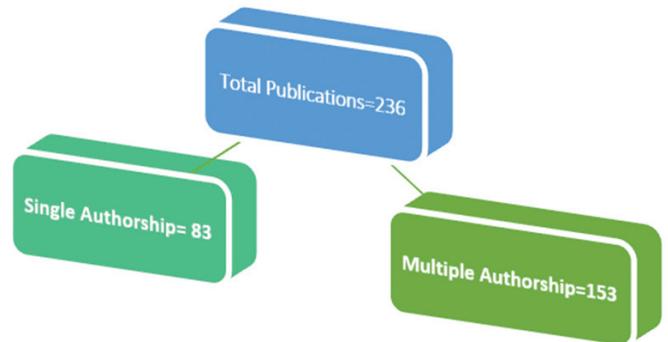


**Figure 6. Visualisation and citation analysis of articles.**

had 18 “items”, which resulted in 6 clusters and 19 “links”. The “prolific publications across the largest set of connected documents” are Holst (2009) with 25 citations followed by Bawden (2005) [21 citations], Petrinic (2007) [21 citations], Bury (2006) [16 citations], Scherrer (2004) [15 citations], Smith (2005) [12 citations] and Watson (2005) [11 citations].

**4.6 Authorship Pattern and Research Collaboration**

Authorship analysis of the top 10 productive countries reveals that 153 publications (64.8 %) have multiple authors and 83 publications (30.9 %) are based on single authorship (Fig. 7). The results of the present work don’t support the findings of the previous studies. Previous studies<sup>19-20</sup> have highlighted the prevalence of single authorship as the most



**Figure 7. Authorship pattern of top 10 productive countries.**

common pattern of authorship. The possible reason for contradiction could be the narrower scope of the current study.

Furthermore, the research collaboration of these countries was “explored at the geographical level which includes”<sup>39</sup>:

- “National Collaboration (NC): Authors affiliated with the institutions of the same country”.
- “International Collaboration (IC): Authors affiliated with institutions of different countries”.

Out of the 153 publications, 108 publications (70.5 %) were based on NC while 45 publications (29.4 %) were a result of IC (Fig. 8). Furthermore, country-wise collaboration analysis reveals that the USA have the maximum number of internationally collaborated studies (12) followed by Australia (6) and England (5) However, China and Japan’s all multiple authorship publications are based on IC. Overall, the results from Fig. 8 suggest that there is a lack of IC amongst researchers from different countries. Earlier studies in LIS further support these findings<sup>25,38</sup>.

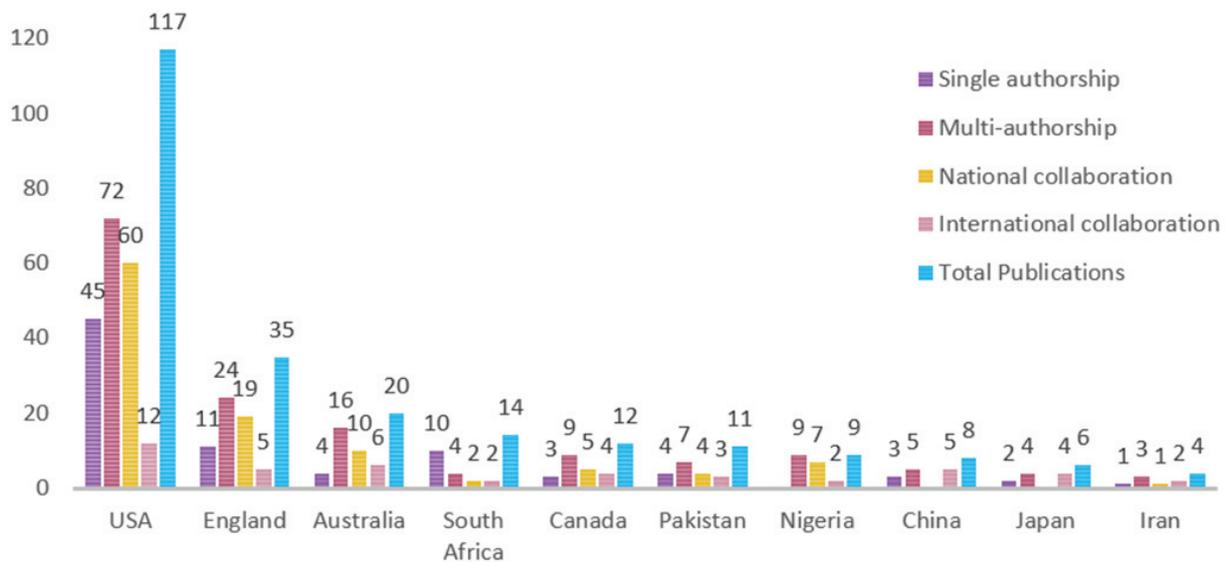


Figure 8. Collaboration pattern of top 10 productive countries.

#### 4.7 Mapping and Visualisation of Keywords Co-occurrence

Figure 9 highlights the “visualisation of keywords co-occurrence”. The minimal criterion was set at three occurrences. which led to 44 “items” across 9 clusters with 176 links and a TLS of 238. According to Chen *et al* <sup>40</sup>, the frequency of keywords can be reflected in the size of nodes; the more frequently occurring a keyword, the greater the node size. The line’s thickness reflects how closely two keywords are related to one another; “the thicker the line between two words, the closer relationship is”. Figure 9 reveals that the term “professional development” is made up of largest node, thus suggesting that it is the frequently used keyword. with a TLS of 41 and 23 occurrences followed by “librarians” with a TLS of 42 and 20 occurrences. These are followed by the terms “academic libraries” and “continuing professional development” with TLS and occurrences of 20,14 and 26,12 respectively. Moreover, the

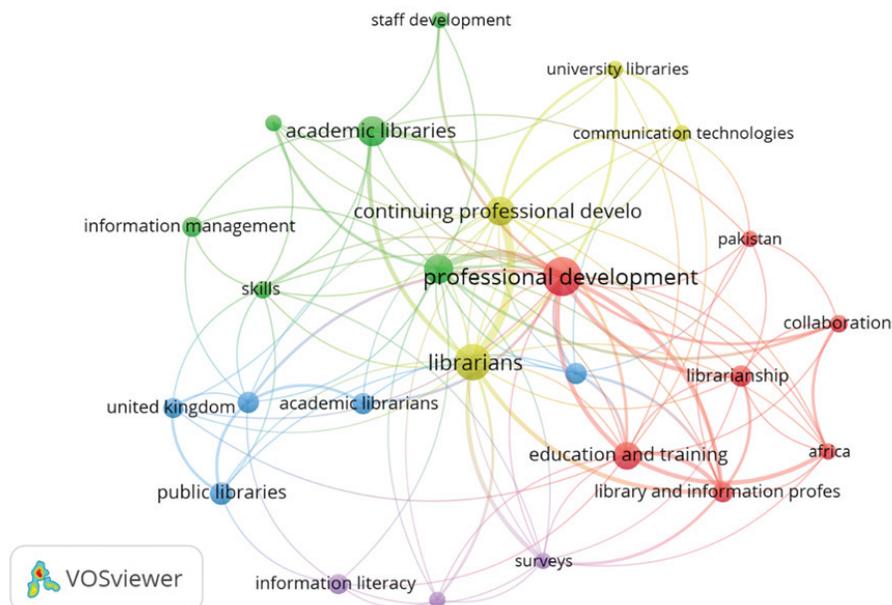


Figure 9. Visualisation and keywords co-occurrence.

co-occurrence network map on VOSviewer, reveals a stronger relationship among the keywords “professional development”, “librarians”, “academic libraries” and “continuing professional development” due to the presence of thicker lines between them. This suggests that the bulk of literature output on the CPD is concentrated in academic libraries. The lack of occurrences of other keywords such as “lifelong learning”, “staff development”, “career development” could also lessen the chances of documents being retrieved.

## 5. CONCLUSION

With the advancements in technology and their impact on how information is accessed and library services are provided, it becomes imperative for the LIS professionals to regularly participate in CPD. Information technology have undoubtedly transformed how people handle their information and how businesses operate in various fields, but the library and information industry faces greater difficulties. The management and use of information and sources has undergone tremendous transformation during the information technology era. It has become necessary for the LIS workers to regularly refresh their knowledge and skills in order to face the difficulties, along with the demand for “efficiency and effectiveness at work”. This could be achieved only through the idea and concept of CPD<sup>41</sup>. It is an important approach for librarians and information professionals who want to improve in their careers. “In meeting the aims of a twenty-first century librarian, the pursuance of CPD is even more crucial in today’s technologically innovative society”<sup>10</sup>.

The findings suggested that developed countries and in particular the USA has taken up the lead. Earlier studies<sup>42-43</sup> also reported the USA to be the most productive country in terms of the LIS research output. This high research productivity could be because the United States has a far larger number of LIS departments and universities than other countries<sup>26</sup>. Furthermore “poor research infrastructure” of the underdeveloped nations also leads to disproportionate research” across the nations<sup>30</sup>. It is also reasonable to assume that “disproportionate research output” leads to “disproportionate growth” in LIS professionals’ skill sets, who in no way can possibly fulfil the world’s information needs equally. Countries that are behind the curve in LIS research productivity should turn to other “LIS-developed” countries to meet their needs. Larger LIS research countries could be beneficial to smaller countries that cohabit with them, as advanced LIS nations can nurture smaller countries in a variety of ways to fulfil their basic needs in the field. Some of the areas include: “Human Resource Development; IT support; Manpower exchange; Financial support”. However, the fact that South Africa and Nigeria are among the top ten most productive nations in the area of CPD in libraries is also praiseworthy. This corroborates with the existing LIS literature<sup>38,45</sup>. Although these two nations are regarded as developing ones, they have nonetheless established a standard and sparked interest in research among African scholars.

Examination of the “Top 10” prolific journals suggested that these journals are published from the USA and the UK. This could be attributed to their long history in the LIS publishing

industry. Similarly, the top 10 highly cited articles have been “published either in journals of the USA or the UK”. This again reflects how these two nations dominate in the LIS publishing world<sup>33</sup>. In the perspective of the “top 10 highly cited” authors, the majority belong to North American or European countries. The authorship pattern and research collaboration “analysis of the top 10” productive countries suggested that the majority of the articles had multiple authors which is in line with the previous studies<sup>19,46-48</sup>. However, International Collaboration (IC) was seen to be minimal among these countries. Barik and Jena<sup>49</sup> also highlighted the lack of IC in LIS. Research related to CPD of the LIS professionals was dominant in academic libraries as the visualisation of the keyword occurrence revealed a stronger relationship among the keywords “professional development”, “librarians”, “academic libraries” and “continuing professional development”. As a result, future researchers should think about conducting surveys at public, national, special and school libraries. Finally, by bibliometric analysis, this work has made an effort to increase awareness of research dynamics related to LIS professionals’ CPD. It is expected that this research would spark increased interest in the LIS discipline for research.

## REFERENCES

1. Saleem, Q.U.A. & Ashiq, M. The facts of continuing professional development for LIS professionals in Pakistan: A literature review. *The Bottom Line*, 2020, **33** (3), 263-271. doi: 10.1108/BL-02-2020-0013
2. Rafiq, M.; Jabeen, M. & Arif, M. Continuing education (CE) of LIS professionals: Need analysis & role of LIS schools, *The J. Acad. Libr.*, 2017, **43**(1), 25-33. doi: 10.1016/j.acalib.2016.10.004
3. Yahaya, I.A.; Aliyu A.A. & Adamu, A.A. Managing academic library services in Nigeria in the 21<sup>st</sup> Century, 2016. <http://ceurws.org/Vol-1830/Paper65.pdf> (Accessed on 20 February 2022).
4. Shongwe, M.M. The information technology influence on LIS job descriptions in South Africa, *Inf. Technol. Develop.*, 2014, **21**(2), 196–204. doi: 10.1080/02681102.2013.874315
5. Jain, P. A paradigm shift in the 21<sup>st</sup> century academic libraries and librarians: Prospectus and opportunities, *Eu. J. Acad. Res.*, 2013, **1**(3), 133–147. [https://www.academia.edu/download/31861869/Priti\\_Jain\\_Paper\\_A\\_paradigm\\_shift\\_in\\_the\\_21st\\_Century\\_Academic\\_Libraries\\_...2013.pdf](https://www.academia.edu/download/31861869/Priti_Jain_Paper_A_paradigm_shift_in_the_21st_Century_Academic_Libraries_...2013.pdf). (Accessed on 20 February 2022).
6. Tomescu, S.A. Blended learning methodology for library professionals” carol I” central university library, In Conference proceedings of» eLearning and Software for Education «(eLSE)., 2018, **4**(14), 436-442). Carol I” National Defence University Publishing House.
7. Emezie, N. A. & Nwaohiri, N.M. 21<sup>st</sup> century librarians and effective information service delivery, *J. Inf. Knowl. Manage.*, 2013, **4**(1). <https://www.ajol.info/index.php/ijikm/article/view/144609>. (Accessed on 22 February 2022).
8. Gautam, K. & Kumar, V. Continuing professional

- development programmes for library and information science professionals in India. *Libr. Waves-A Biannual Peer Rev. J.*, 2020, **6**(1), 14-23. <http://www.librarywaves.com/index.php/lw/article/view/86>. (Accessed on 15 March 2022).
9. Robinson, M.G. Continuing professional development and special librarians in Jamaica. *Libr. Manag.*, 2019, **40** (6/7), 416-427. doi: 10.1108/LM-12-2018-0093
  10. Bowen-Chang, P. & Hosein, Y. Continuing professional development of academic librarians in Trinidad and Tobago. *Global Knowl., Memory and Commun.*, 2019, **68**(1/2), 93-111. doi: 10.1108/GKMC-08-2018-0072
  11. Moonasar, A. & Underwood, P.G. Continuing professional development opportunities in information and communication technology for academic librarians at the Durban University of Technology, *South African J. Libr. Inf. Sci.*, 2018, **84**(1), 47-55. <https://hdl.handle.net/10520/EJC-10c9005ca1>. (Accessed on 22 March 2022).
  12. Dzandza, P.E. & Akussah, H. Professional development in private university libraries in Ghana, *Libr. Manage.*, 2018, **39**(6-7), 488-502. doi: 10.1108/LM-06-2017-0055
  13. Broady-Preston, J. & Cossham, A. Keeping the information profession up to date: Are compulsory schemes the answer?, *IFLA Journal*, 2011, **37**(1), 28-38. doi: 10.1177/0340035210396777
  14. Lotka, A.J. The frequency distribution of scientific productivity. *J. Washington Acad. Sci.*, 1926, **16**(12), 317-323. <https://www.jstor.org/stable/24529203>. (Accessed on 23 March 2022).
  15. Ahmad, P. & Slots, J. A bibliometric analysis of periodontology. *Periodontology*, 2000, 2021 **85**(1), 237-240. doi: 10.1111/prd.12376
  16. Garfield, E. Citation indexes for science. A new dimension in documentation through association of ideas, *Int. J. Epidemiol.*, 2006, **35**(5), 1123-1127. doi: 10.1093/ije/dyl189
  17. Ahmad, P.; Asif, J.A.; Alam, M. K. & Slots, J. A bibliometric analysis of Periodontology 2000. *Periodontology 2000*, 2020, **82**(1), 286-297. doi: 10.1111/prd.12328
  18. Pritchard, A. Statistical bibliography or bibliometrics, *Journal of Documentation*, 1969, **25** (4), 348-349
  19. Wani, J.A.; Ganaie, S.A. & Rehman, I.u. Mapping research output on Library and Information Science research domain in South Africa: A bibliometric visualisation. *Inf. Discovery and Delivery*, 2022. doi: 10.1108/IDD-10-2021-0115
  20. Ashiq, M.; Ur Rehman, S.; Muneeb, D. & Ahmad, S. Global research on library service quality: A bibliometric analysis and knowledge mapping, *Global Knowl., Memory and Commun.*, 2021, **71**(4/5), 253-273. doi: 10.1108/GKMC-02-2021-0026
  21. Islam, M. & Roy, P.K. Bibliometric study of scholarly productivity of library and information science research in Bangladesh from 1971-2020, *DESIDOC J. Libr. Inf. Technol.*, 2021, **41**(3), 213-225. doi: 10.14429/djlit.41.03.16854
  22. Sahu, R.R. & Parabhoi, L. Bibliometric study of library and information science journal articles during 2014-2018: LIS research trends in India. *DESIDOC J. Libr. Inf. Technol.*, 2020, **40**(6), 390-395. doi: 10.14429/djlit.40.6.15631
  23. Patil, S.B. Global library & information science research seen through prism of biblioshiny, *Stud. Indian Place Names*, 2020, **40**(49), 157-170. [https://www.researchgate.net/profile/Sb-Patil-2/publication/339973834\\_Global\\_Library\\_Information\\_Science\\_Research\\_seen\\_through\\_Prism\\_of\\_Biblioshiny/links/5e7090a392851c1a689a7dc9/Global-Library-Information-Science-Research-seen-through-Prism-of-Biblioshiny.pdf](https://www.researchgate.net/profile/Sb-Patil-2/publication/339973834_Global_Library_Information_Science_Research_seen_through_Prism_of_Biblioshiny/links/5e7090a392851c1a689a7dc9/Global-Library-Information-Science-Research-seen-through-Prism-of-Biblioshiny.pdf) (Accessed on 12 August 2022).
  24. Ahmad, K.; JianMing, Z. & Rafi, M. Assessing the literature of knowledge management (KM) in the field of library and information science, *Inf. Discovery Delivery*, 2019, **47**(1), 35-41. doi: 10.1108/IDD-06-2018-0021
  25. Okeji, C.C. Research output of librarians in the field of library and information science in Nigeria: A bibliometric analysis from 2000-March, 2018, *Collection and Curation*, 2019, **38**(3), 53-60. doi: 10.1108/CC-04-2018-0012
  26. Ahmad, K.; Sheikh, A. & Rafi, M. Scholarly research in Library and Information Science: An analysis based on ISI Web of Science, *Perform. Meas. Metrics*, 2019, **21**(1), 18-32. doi: 10.1108/PMM-06-2019-0024
  27. Shukla, A.; Sharma, J.; Kumar, S.; Mahala, A. & Tripathi, M. Library and Information Science research in India during the last four decades (1980-2019): A brief analysis. *DESIDOC J. Libr. Inf. Technol.*, 2020, **40**(6), 360-368. doi: 10.14429/djlit.40.6.15948
  28. Ahmad, K.; Ming, Z.J. & Rafi, M. Assessing the digital library research output: Bibliometric analysis from 2002 to 2016. *The Electronic Library*, 2018, **36**(4), 696-704. doi: 10.1108/EL-02-2017-0036
  29. Garg, K.C. & Sharma, C. Bibliometrics of Library and Information Science research in India during 2004-2015, *DESIDOC J. Libr. Inf. Technol.*, 2017, **37**(3), p.221. doi: 10.14429/djlit.37.3.11188
  30. Pandita, R. & Singh, S. Research growth in LIS during last decade: A study", *Library Review*, 2015, **64**(8/9), 514-532. doi: 10.1108/LR-04-2015-0037
  31. De Bem, R.M. & Coelho, C.C.D.S.R. Applications of knowledge management in the area of librarianship and information science: a systematic review, *Brazilian J. Inf. Sci.: Res. Trends*, 2013, **7**(1), 69-97. <https://www.proquest.com/scholarly-journals/applications-knowledge-management-area/docview/1727428715/se-2>

- (Accessed on 10 April 2022).
32. Liang, T.P. & Liu, Y.H. Research landscape of business intelligence and big data analytics: A bibliometrics study, *Expert Sys. Appl.*, 2018, **111**, 2-10, doi: 10.1016/j.eswa.2018.05.018.
  33. Kessler, M.M. Concerning some problems of intrascience communication. Massachusetts, USA: Massachusetts Institute of Technology, Lincoln Laboratory, 1958
  34. Van Eck, N.J. & Waltman, L. Visualizing bibliometric networks”, In *Measuring Scholarly Impact* edited by Ding Y.; Rousseau, R.; Wolfram, D.; Springer, Cham, 2014
  35. Cox, T.F. & Cox. M.A.A. Multidimensional scaling, Chapman and Hall/CRC, New York, 2000.
  36. Van Eck, N.J. & Waltman, L. Software survey: VOSviewer, a computer program for bibliometric mapping, *Scientometrics*, 2010, **84**(2), 523-538, doi: 10.1007/s11192-009-0146-3.
  37. Asubiaro, T.V. Research collaboration landscape of the University of Ibadan biomedical authors between 2006 and 2015, *Af. J. Libr., Archives Inf. Sci.*, 2018, **28**(1), 17-31. <https://www.ajol.info/index.php/ajlais/article/view/174149>. (Accessed on 05 May 2022).
  38. Asubiaro, T. How collaboration type, publication place, funding and author’s role affect citations received by publications from Africa: A bibliometric study of LIS research from 1996 to 2015, *Scientometrics*, 2019, **120**(3), 1261-1287. doi: 10.1007/s11192-019-03157-1
  39. Rehman, I.u.; Ganaie, S.A. & Wani, J.A. “Research that sparked attention on the social Web in 2020: An Altmetric analysis of “top 100” articles”, *Global Knowl., Memory Commun.*, 2022. doi: 10.1108/GKMC-08-2021-0136
  40. Chen, X.; Chen, J.; Wu, D.; Xie, Y. & Li, J. Mapping the research trends by co-word analysis based on keywords from funded project. *Procedia Comput. Sci.*, 2016, **91**, 547-555. doi: 10.1016/j.procs.2016.07.140
  41. Sambo, A.S.; Igiomoh, V.E. & Abu-Udenyi, H. Continuous professional development activities of professional librarians in Nigeria. *Int. J. Afr. Asian Stud.–An Open Access Int. J.*, 2014, **5**, 45-51. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.856.4679&rep=rep1&type=pdf>. (Accessed on 02 June 2022).
  42. Jabeen, M.; Yun, L.; Rafiq, M. & Jabeen, M. Research productivity of library scholars: Bibliometric analysis of growth and trends of LIS publications, *New Library World*, 2015, **116**(7-8), 433-454. doi: 10.1108/NLW-11-2014-0132.
  43. Jabeen, M.; Yun, L.; Wang, X.; Rafiq, M.; Mazher, A.; Tahir, M.A. & Jabeenf, M. “A study to analyze collaboration patterns for Asian library and information science (LIS) scholars on author”, *Institutional and Country Levels, Serials Review*, 2016, **42**(1), 18-30. doi: 10.1080/00987913.2016.1139526
  44. Dhawan, S.M.; Gupta, B.M.; Gupta, R.; Kumar, A. & Bansal, J. Quantitative assessment of Global Literature on ‘Web 2.0 and Libraries’ during 2006-15, *DESIDOC J. Libr. Inf. Technol.*, 2016, **36**(5), 261-268. doi: 10.14429/djlit.36.5.10350
  45. Onyancha, O.B. Mapping collaboration and impact of library and information science research in sub-Saharan Africa, from 1995 to 2016, *Libr. Manage.*, 2018, **39**(6-7), 349-363. doi: 10.1108/LM-06-2017-0059.
  46. Han, P.; Shi, J.; Li, X.; Wang, D.; Shen, S. & Su, X. International collaboration in LIS: Global trends and networks at the country and institution level, *Scientometrics*, 2014, **98** (1), 53-72. doi: 10.1007/s11192-013-1146-x.
  47. Mukherjee, B. Assessing Asian scholarly research in Library and Information Science: A quantitative view as reflected in web of knowledge, *The J. Acad. Libr.*, 2010, **36**(1), 90-10. doi: 10.1016/j.acalib.2009.12.003.
  48. Park, T.K. Asian and pacific region authorship characteristics in leading library and information science journals. *Serials Review*, 2008, **34**(4), 243-251. doi: 10.1016/j.serrev.2008.08.004.
  49. Barik, N. & Jena, P. Growth of LIS research articles in India seen through scopus: a bibliometric analysis, *Libr. Philos. Pract.*, 2014, 1. <https://www.academia.edu/download/68473329/viewcontent.pdf> (Accessed on 14 August 2022).

## CONTRIBUTORS

**Mr Ikhtlaq-ur-Rehman** has qualified the Junior Research Fellowship and National Eligibility Test conducted by the University Grants Commission, India. Contribution in the current study is Conceptualisation, Methodology; Analysis; Writing original draft.

**Mr Javaid Ahmad Wani** has qualified National Eligibility Test conducted by the University Grants Commission, India. Contribution in the current study is Methodology; Writing Review & Editing.

**Prof. Shabir Ahmad Ganaie** is presently heading the Department of Library and Information Science, University of Kashmir, India. He has qualified the National Eligibility Test conducted by the University Grants Commission. His area of specialisation include: Foundations of library and information science; Fundamentals of library Management; Human Resource Management in Libraries and Academic Library System. Contribution in the current study is overall supervision.